

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

What is claimed is:

1. A closed loop medicament pump system for a patient for sampling and determining the concentration of a substance of interest through the patient's skin and for determining and delivering a responsive dose of an appropriate medicament to the patient comprising:

an iontopheretic sensor module for sampling and detecting a concentration of a substance of interest through skin;

a control system, responsive to the iontopheretic sensor module, for determining a response to the sampled and determined concentration of a substance of interest;

a sensor telemetry system for transmitting information regarding the response determined by the control system through the patient's body;

a pump telemetry system for receiving information regarding the response determined by the control system through the patient's body and for communicating the information to an implantable drug pump; and

an implantable drug pump, acting in response to the information communicated to the implantable drug pump from the pump telemetry system, to deliver a responsive dose of an appropriate medicament to the patient.

2. A closed loop medicament pump system for a patient for sampling and determining the concentration of a substance of interest through the patient's skin and for determining and delivering a responsive dose of an appropriate medicament to the patient comprising:

an iontopheretic sensor module for sampling and determining a concentration of a substance of interest through skin;

a sensor telemetry system for transmitting information regarding the concentration of a substance of interest determined by the iontopheretic sensor module through a patient's body;

a pump telemetry system for receiving information regarding the concentration of a substance of interest determined by the iontopheretic sensor module through the patient's body and for communicating the information to a control system;

a control system, responsive to the pump telemetry system, for determining a response to the sampled and determined concentration of a substance of interest and for communication the response to an implantable drug pump; and

an implantable drug pump, acting in response to the information communicated to the implantable drug pump from the control system to deliver a responsive dose of an appropriate medicament to the patient.

3. A closed loop medicament pump for a patient for sampling and determining the concentration of a substance of interest through the patient's skin and for determining and delivering a responsive dose of an appropriate medicament to the patient comprising:

a sensor module for sampling and determining the concentration of a substance of interest in the patient;

a control system for determining an appropriate response the determined concentration of the substance of interest;

an implantable drug pump for dispensing an appropriate amount of a medicament to the patient;

means for communicating information from the sensor module to the control system; and,

means for communicating information from the control system to the implantable drug pump.

4. A closed loop medicament pump according to claim 3 wherein the sensor module 12 comprised a sampling system and a concentration determining system.

5. A closed loop medicament pump according to claim 4 wherein the sampling system is an iontopheretic system.

6. A closed loop medicament pump according to claim 4 wherein the concentration determining system is also shown in the herein above referenced '714 patent to Guy et al.

7. A closed loop medicament pump according to claim 3 wherein the sensor module is an external sensor.

8. A closed loop medicament pump according to claim 3 wherein the sensor module is disposable.

9. A closed loop medicament pump according to claim 3 wherein the sensor module is reusable.

10. A closed loop medicament pump according to claim 3 wherein the sensor module is attached to a flexible substrate.

11. A closed loop medicament pump according to claim 10 wherein the flexible substrate includes an adhesive to adhere the sensor module to skin of a patient.

12. A closed loop medicament pump according to claim 3 wherein the control system is a microprocessor.

13. A method of treating a medical condition in a patient comprising the steps of:

providing a sensor module for sampling and determining the concentration of a substance of interest in the patient;

a control system for determining an appropriate response the determined concentration of the substance of interest;

an implantable drug pump for dispensing an appropriate amount of a medicament to the patient;

means for communicating information from the sensor module to the control system; and,

means for communicating information from the control system to the implantable drug pump;

determining the concentration of a substance of interest;

comparing the determined concentration of the substance of interest to a predetermined limit;

determining an appropriate response to the determined concentration of the substance of interest;

communicating the determined appropriate response to the medicament pump;

if an appropriate response is determined to be to infuse medicament to a patient, infusing medicament to the patient.